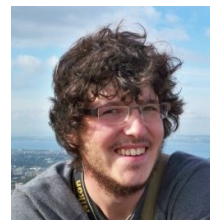# Clément Weisbecker, Ph.D.

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Research Interests

My main research interests are in many aspects of Computational Linear Algebra. So far, I focused my activity on direct methods for the solution of dense and sparse linear systems. I investigate fast low-rank approximation kernels and methods. I co-authored a research implementation of Block Low-Rank kernels in MUMPS (MUltifrontal Massively Parallel Solver) in which project I have been involved as a Ph.D. student. I have developed both serial and distributed industrial softwares, in C and Fortran (10K+ lines of code in the Spooles library and LS-Dyna multiphysics simulation software).

Professional experience

January 2014 to date	Research scientist at Livermore Software Technology Corporation, 7374 Las Positas Road, Livermore CA 94551, United States. Research, development and implementation of linear solvers in LS-Dyna.
April-Sept. 2010	Internship at IRIT (Computer Science Research Institute of Toulouse), 2 rue Charles Camichel, Toulouse, France, with APO (Parallel Algorithms and Optimization) team. Collaboration to MUMPS project. Study on low-rank approximations of frontal matrices.
July-August 2009	Internship at Tor Vergata University, via di Tor Vergata, Rome, Italy, in Salvatore Filippone's team. Study on one-way dissection algorithms to reduce the fill-in in sparse matrix factorizations.
July 2008	Internship at Bragard S.A., 50 rue Leo Valentin, 88000 Épinal, France. Factory worker in the expedition and reception teams.

Education

October 2010 – October 2013	Ph.D. degree in Computer Science and Applied Mathematics at INPT(ENSEEIHT)-IRIT, 2 rue Charles Camichel, 31000 Toulouse, France. Ph.D. thesis: *Improving multifrontal solvers by means of algebraic Block Low-Rank representations* . Awarded the selective Leopold Escande Prize. Defense date: 28/10/2013. Advisors: Patrick Amestoy and Alfredo Buttari . Referees: Tim Davis and Esmond Ng . President of the Jury: Iain S. Duff .
July 2011	Hausdorff Research Institute for Mathematics, Poppelsdorfer Allee 45, 53115 Bonn, Germany. Summer school on $\mathcal{H}$-matrices with W. Hackbusch, S. Börm and L .Grasedyck.
Sept.-Dec. 2009	University of Edinburgh, Old College, South Bridge, Edinburgh EH8 9YL, Scotland, United Kingdom. Visiting student (financial mathematics, applied mathematics, economics, computer science).
2007–2010	ENSEEIHT, 2 rue Charles Camichel, 31000 Toulouse, France MSc & Engineering degree in Computer Science and Applied Mathematics. Master's thesis: *Frontal matrices factorizations — Low-rank forms* .

Publications

2015	P. Amestoy, C. Ashcraft, O. Boiteau, A. Buttari, J-Y. L'Excellent and C. Weisbecker. *Improving multifrontal methods by means of block low-rank representations* . Society for Industrial and Applied Mathematics (SIAM), Vol. 37 N. 3, p. 1451-1474, July 2015.
	P. Amestoy, R. Brossier, A. Buttari, J.-Y. L'Excellent, T. Mary, L. Métivier, A. Miniussi, S. Operto, J. Virieux and C. Weisbecker *3D frequency-domain seismic modeling with a Parallel BLR multifrontal direct solver* . Proceeding of International Conference "Society of Exploration Geophysicits (SEG) Annual Meeting" with peer-review, New Orleans, USA.
	P. Amestoy, R. Brossier, A. Buttari, J.-Y. L'Excellent, T. Mary, L. Métivier, A. Miniussi, S. Operto, A. Ribodetti, J. Virieux and C. Weisbecker *Efficient 3D frequency-domain full-waveform inversion of ocean-bottom cable data with sparse block low-rank direct solver: a real data case study from the North Sea* . Proceeding of International Conference "Society of Exploration Geophysicits (SEG) Annual Meeting" with peer-review, New Orleans, USA.
2014	B. Pajot, Y. Li, V. Berthoumieux, C. Weisbecker, R. Brossier, L. Metivier, P. Thierry, S. Operto and J. Virieux. *A review of recent forward problem developments used for frequency-domain FWI* . Expanded Abstracts, 76th Annual "European Association of Geoscientists and Engineers (EAGE)" Conference & Exhibition, with peer-review, Amsterdam, Netherlands.
2013	C. Weisbecker, P. Amestoy, O. Boiteau, R. Brossier, A. Buttari, J.-Y. L'Excellent, S. Operto and J. Virieux. *3D frequency-domain seismic modeling with a Block Low-Rank algebraic multifrontal direct solver* . Proceeding of International Conference "Society of Exploration Geophysicits (SEG) Annual Meeting" with peer-review, Houston, USA.
	E. Agullo, P. Amestoy, A. Buttari, A. Guermouche, G. Joslin, J.-Y. L'Excellent, X. S. Li, A. Napov, F.-H. Rouet, M. Sid-Lakhdar, S. Wang, C. Weisbecker and I. Yamazaki. *Recent advances in sparse direct solvers* . Proceeding of International Conference on Structural Mechanics in Reactor Technology (SMIRT-22) with peer-review, San Francisco, USA.
	P. Amestoy, A. Buttari, G. Joslin, J.-Y. L'Excellent, M. Sid-Lakhdar, C. Weisbecker, M. Forzan, C. Pozza, R. Perrin and V. Pellissier. *Shared memory parallelism and low-rank approximation techniques applied to direct solvers in FEM simulation* . IEEE Transactions on Magnetics, IEEE, Numéro spécial Extended selected short papers from Compumag 2013 conference, Budapest, Hungary.

Presentations

SIAM Parallel Processing 2014, Portland (OR), United States	*Parallelization and Pivoting in a Block-Low Rank Multifrontal Solver* . Joint work with P. Amestoy, C. Ashcraft, O. Boiteau, A. Buttari and J-Y. L'Excellent.
Sparse Days 2013, CERFACS, Toulouse, France	*Block Low-Rank (BLR) approximations to improve multifrontal sparse solvers* . Joint work with P. Amestoy, C. Ashcraft, O. Boiteau, A. Buttari and J-Y. L'Excellent.
SIAM Linear Algrebra 2012, Valencia, Spain	*Improving Multifrontal Methods by means of Low-Rank Approximation techniques* . Joint work with P. Amestoy, C. Ashcraft, O. Boiteau, A. Buttari and J-Y. L'Excellent.
Preconditioning 2011, Bordeaux, France	*Grouping variables in Frontal Matrices to improve Low-Rank Approximations in a Multifrontal Solver* . Joint work with P. Amestoy, C. Ashcraft, O. Boiteau, A. Buttari and J-Y. L'Excellent.

Languages

French	Native language.
English	Fluent, TOEIC 930 (2010).
Portuguese	Intermediate level.
German	Basic.